

REMARKS

Reconsideration and allowance of the present application based on the following remarks are respectfully requested.

Claims 1-9, 14-22, 24, 28-30, 38-39, and 41-43 are amended. Claims 10-13, 27, 31, 35, and 40 are cancelled without prejudice or disclaimer. After entry of this Amendment, claims 1-9, 14-26, 28-30, 32-34, 36-39, and 41-43 will remain pending in the application.

The specification was objected to under 35 U.S.C. §112, first paragraph. In response, the specification has been amended in accordance with the suggestion of the Examiner. No new matter has been added. Accordingly, reconsideration and withdrawal of the objection to the specification are respectfully requested.

Claims 24-27 were objected to under 35 U.S.C. §112, first paragraph. Claim 27 has been cancelled without prejudice or disclaimer, thus rendering moot the rejection of claim 27. With respect to claim 24, the language "said support structure" has been changed to "said moveable support structure". Applicant respectfully submits that the amendment to claim 24 obviates the rejection. Claims 25-26 are patentable by virtue of their dependency from claim 24. Accordingly, reconsideration and withdrawal of the objection to claims 24-26 are respectfully requested.

Figure 2 was objected to. In response, Figure 2 has been designated by the legend "Prior Art" in accordance with the suggestion of the Office Action. Accordingly, reconsideration and withdrawal of the objection to Figure 2 are respectfully requested.

The drawings were objected to under 37 C.F.R. §1.83(a). In response, Figure 3 has been amended and new Figures 4-6 have been added in order to show every feature of the invention specified in the claims. It is respectfully submitted that no new matter has been added and that the amendment to Figure 3 and the addition of Figures 4-6 obviate the objection. Applicant notes that new Figures 4-6 merely illustrate the elements described in the application as filed. A basis for Figure 4 may be found, for example, on page 9, lines 3-8 of the specification. A basis for Figure 5 may be found, for example, on page 11, lines 20-29, page 12, lines 1-9 and from page 19, line 15 to page 21, line 15. A basis for Figure 6 may be found, for example, on page 4, lines 16-17, and page 21, lines 20-21. A basis for the changes to figure 3 may be found, for example, in original claim 15. Applicant notes that original claim 15 is part of the application as filed and can be relied upon to establish a disclosure. See MPEP 608.01(I) Accordingly, reconsideration and withdrawal of the objection to the drawings under 37 C.F.R. §1.83(a) are respectfully requested.

Claims 22, 23 and 37 were rejected under 35 U.S.C. §102(e) based on Nishi et al. (U.S. Pat. No. 6,400,441) (Nishi). It is respectfully submitted that the amendment to claim 22 obviates the rejection.

Claim 22 has been amended to positively recite the limitation of claim 31 and claim 35. No new matter has been added. Claim 22, as amended, recites a device manufacturing method comprising, *inter alia*, measuring displacements of one of said support structure and said substrate table in at least two degrees of freedom using at least one grid grating mounted thereon and at least one sensor head wherein said at least one grid grating is positioned so as to be substantially coplanar with a functional surface of said patterning structure or the substrate. As conceded in the Office Action (see page 8), Nishi does not describe a method including at least these features. Therefore, Nishi does not describe each and every feature recited by claim 22 and, as a result, cannot anticipate claim 22.

Claims 23 and 37 are patentable by virtue of their dependency from claim 22 and for the additional features recited therein.

Accordingly, reconsideration and withdrawal of the rejection of claims 23 and 37 under 35 U.S.C. §102(e) based on Nishi are respectfully requested.

Claims 24-26 were rejected under 35 U.S.C. §102(e) based on Taniguchi et al. (U.S. Pat. No. 6,151,122) (Taniguchi). It is respectfully submitted that the amendment to claim 24 obviates the rejection.

Claim 24 has been amended to positively recite the limitation of claim 27 and the fact that the grid grating is positioned so as to be substantially coplanar with a functional surface that includes said reference pattern. No new matter has been added. Applicant respectfully submits that claim 24 is patentable over Taniguchi at least because it recites a method of calibrating a lithographic projection apparatus comprising, *inter alia*, measuring the position of said moveable support structure using at least one grid grating mounted thereon and at least one sensor head in at least a first degree of freedom when each of the reference marks is projected onto said image sensor, wherein said grid grating is positioned so as to be substantially coplanar with a functional surface that includes said reference pattern. As conceded in the Office Action (see page 8), Taniguchi does not describe a method including at least these features. Therefore, Taniguchi does not describe each and every feature recited by claim 24 and, as a result, cannot anticipate claim 24.

Claims 25 and 26 are patentable by virtue of their dependency from claim 24 and for the additional features recited therein.

Accordingly reconsideration and withdrawal of the rejection of claims 24-26 under 35 U.S.C. §102(e) based on Taniguchi are respectfully requested.

Claims 1, 3, 5-6, 8-10, 12, 14, 15, 18-21, 28, 30-33, 35-36, 38-40, and 42 were rejected under 35 U.S.C. §103(a) based on Nishi. The rejection is respectfully traversed.

Claims 10, 12, 31, 35, and 40 have been cancelled without prejudice or disclaimer, thus rendering moot the rejection of claims 10, 31, 35, and 40.

Claim 1 has been amended to positively recite the limitation of claim 10. No new matter has been added. Namely, claim 1 has been amended to recite a lithographic projection apparatus wherein the or each said grid grating is positioned so as to be substantially coplanar with a functional surface of said patterning structure supported by said support structure or a substrate held by said substrate table. As conceded in the Office Action (see page 8), Nishi fails to teach or suggest a grid grating that is substantially coplanar with a functional surface of said patterning structure supported by said support structure or a substrate held by said substrate table. The Office Action, however, alleges that it would have been obvious to locate the grid grating substantially coplanar with a substrate or the patterning structure. Applicant respectfully disagrees and notes that "the mere fact that a worker in the art could rearrange the parts of the reference device to meet the terms of the claims [on appeal] is not by itself sufficient to support a finding of obviousness." MPEP 2144.04 (citing *Ex parte Chicago Rawhide Mfg. Co.*, 223 USPQ 351, 353 (Bd. Pat. App. & Inter. 1984)). In addition, it is respectfully submitted that in order to establish a *prima facie* case of obviousness, "the prior art must provide a motivation or reason for the worker in the art, without the benefit of [appellant's] specification, to make the necessary changes in the reference device." *Id.* Clearly, the Office Action fails to point out where in Nishi such a motivation is provided. All that is disclosed in Nishi, is that a two-dimensional grating may be formed on the lower surface of the wafer stage, so that the position can be read by an optical encoder from below the stage level surface. (See col. 97, lines 44-48) In addition, the Examiner's attention is directed to the fact that a grid grating positioned so as to be substantially coplanar with a functional surface of the patterning structure or a substrate clearly modifies the operation of the lithographic apparatus (as compared to the operation of a lithographic apparatus including a grid grating that would be differently positioned). (See MPEP 2144.04 citing *In re Japikse*, 181 F.2d 1019, 86 USPQ 70 (CCPA 1950)) For example, it is respectfully submitted that with such an arrangement, there may be no need anymore to monitor the pitch and roll of the patterning structure or the substrate in order to minimize any Abbe errors and to ensure

accurate positioning. (See page 16, lines 6-8, of the specification) As a result, the operation of the lithographic apparatus may be greatly eased. Therefore, it is respectfully submitted that at least under *In re Japikse*, cited in the Office Action, the Examiner has not set forth a *prima facie* case of obviousness.

Claims 3, 6, 8, 15, and 18-21 depend from claim 1, and are patentable for the same reasons provided above related to claim 1 and for the additional features recited therein.

Claim 5 is patentable over Nishi at least because it recites a lithographic projection apparatus comprising, *inter alia*, a displacement measuring system that measures the position of a moveable object, comprising one of said support structure and said substrate table, in at least two degrees of freedom, said displacement measuring system comprising at least one grid grating mounted on a reference frame and at least one sensor head mounted on said moveable object that measures displacement of said moveable object relative to said grid grating in at least two degrees of freedom. As conceded in the Office Action, Nishi fails to teach or suggest that the at least one grid grating is mounted on a reference frame and that the sensor head is mounted on the moveable object. The Office Action, however, alleges that it would have been obvious to provide such an arrangement. Applicant respectfully disagrees and submits that in order to establish a *prima facie* case of obviousness, the reference(s) must teach or suggest all claim features. In the present case, Nishi fails to teach or suggest a reference frame on which the grid grating is mounted and, as a result, cannot render obvious claim 5. Applicant also notes that "the mere fact that a worker in the art could rearrange the parts of the reference device to meet the terms of the claims [on appeal] is not by itself sufficient to support a finding of obviousness." MPEP 2144.04 (citing *Ex parte Chicago Rawhide Mfg. Co.*, 223 USPQ 351, 353 (Bd. Pat. App. & Inter. 1984)). In addition, it is respectfully submitted that in order to establish a *prima facie* case of obviousness, "the prior art must provide a motivation or reason for the worker in the art, without the benefit of [appellant's] specification, to make the necessary changes in the reference device." *Id.* Clearly, the Office Action fails to point out where in Nishi such a motivation is provided. All that is disclosed in Nishi, is that a two-dimensional grating may be formed on the lower surface of the wafer stage, so that the position can be read by an optical encoder from below the stage level surface. (See col. 97, lines 44-48) However, it is respectfully submitted that Nishi is silent about a motivation to arrange the grid grating on a reference frame and the sensor head on the moveable object.

Claims 9, 14, 28 and 30 depend from claim 5 and are patentable for the same reasons given above related to claim 5 and for the additional features recited therein.

Claims 32-33, and 35-36 depend from amended claim 22 and are patentable over Nishi for the same reasons related to claim 22 and for the additional features recited therein. Namely, claims 32-33 and 35-36 are patentable over Nishi at least because these claims recite a device manufacturing method wherein said at least one grid grating is positioned so as to be substantially coplanar with a functional surface of said patterning structure or the substrate. As mentioned in the foregoing discussion related to claim 1, it is respectfully submitted that Nishi does not provide a motivation or suggestion to position the at least one grid grating so as to be substantially coplanar with a functional surface of the patterning structure or the substrate, nor does the knowledge generally available to one skilled in the art. In addition, it is respectfully submitted that claim 32 is patentable over Nishi at least because it recites a device manufacturing method wherein the at least one grid grating is mounted on a reference frame and the at least one sensor head is mounted on said moveable object. As mentioned in the discussion related to claim 5, Nishi is silent about a motivation or suggestion to provide such an arrangement, so is the knowledge generally available to one skilled in the art.

Claim 38 has been amended to positively recite the limitation of claim 40. Claim 38, as amended, recites a lithographic projection apparatus wherein said at least one grid grating is positioned so as to be substantially coplanar with a functional surface of said patterning structure supported by said support structure, said first substrate held by said first substrate table or said second substrate held by said second substrate table. In view of the foregoing discussion related to claim 1, it is respectfully submitted that Nishi does not provide a motivation to provide such a grid grating arrangement.

Claim 39 is patentable over Nishi by virtue of its dependency from claim 38 and for the additional features recited therein.

Claim 42 has been amended to positively recite a lithographic projection apparatus wherein the at least one grid grating is positioned so as to be substantially coplanar with a functional surface of said mask. No new matter has been added. For the same reasons provided above related to claim 1, it is respectfully submitted that Nishi fails to offer a motivation or suggestion to provide such an arrangement.

Accordingly, reconsideration and withdrawal of the rejection of claims 1, 3, 5-6, 8-10, 12, 14, 15, 18-21, 28, 30-33, 35-36, 38-40, and 42 under 35 U.S.C. §103(a) based on Nishi are respectfully requested.

Claims 2, 4, 7, 11, 13, 16, 41 and 43 were rejected under 35 U.S.C. §103(a) based on Nishi in view of Miyachi (Reg. Number H1774). The rejection is respectfully traversed.

Claims 11 and 13 have been cancelled without prejudice or disclaimer, thus rendering moot the rejection of claims 11 and 13.

Claims 2, 4, 7, and 16 depend from amended claim 1 and are patentable over Nishi for the same reasons provided above related to claim 1. Namely, these claims are patentable over Nishi at least because they recite a lithographic projection apparatus wherein the or each said grid grating is positioned so as to be substantially coplanar with a functional surface of said patterning structure supported by said support structure or a substrate held by said substrate table. As mentioned previously in the discussion related to claim 1, Nishi does not set forth a motivation to provide such a grid grating arrangement, nor does the knowledge generally available to one skilled in the art. Furthermore, as conceded by the Examiner in the Office Action, Miyachi fails to teach or suggest such an arrangement as well. Applicant also respectfully submits that Miyachi does not set forth a motivation to provide a coplanar positioning for the same reasons discussed above related to claim 1, nor does the knowledge generally available in the art.

Claim 41 depends from claim 38 and is patentable over Nishi for the same reasons given above related to claim 41. Namely, claim 41 is patentable over Nishi at least because it recites a lithographic projection apparatus wherein said at least one grid grating is positioned so as to be substantially coplanar with a functional surface of said patterning structure supported by said support structure, said first substrate held by said first substrate table or said second substrate held by said second substrate table. As mentioned previously in the discussion related to claim 1, Nishi does not set forth a motivation to provide such a grid grating arrangement, nor does the knowledge generally available to one skilled in the art. Furthermore, as conceded by the Examiner in the Office Action, Miyachi fails to teach or suggest such an arrangement as well. Applicant also respectfully submits that Miyachi does not set forth a motivation to provide a coplanar positioning for the same reasons discussed above related to claim 38, nor does the knowledge generally available in the art.

Claim 43 depends from claim 42 and is patentable over Nishi for the same reasons given above related to claim 42. Namely, claim 43 is patentable over Nishi at least because it recites a lithographic projection apparatus wherein the at least one grid grating is positioned so as to be substantially coplanar with a functional surface of said mask. As mentioned previously in the discussion related to claim 43, Nishi does not offer a motivation to provide

such a grid grating arrangement, nor does the knowledge generally available to one skilled in the art. Furthermore, as conceded by the Examiner in the Office Action, Miyachi fails to teach or suggest such an arrangement as well. Applicant also respectfully submits that Miyachi does not set forth a motivation to provide a coplanar positioning for the same reasons discussed above related to claim 42, nor does the knowledge generally available in the art.

Accordingly, reconsideration and withdrawal of the rejection of claims 2, 4, 7, 16, 41 and 43 under 35 U.S.C. §103(a) based on Nishi in view of Miyachi are respectfully requested.

Claims 17, 29 and 34 were rejected under 35 U.S.C. §103(a) based on Nishi in view of Stanton et al. (U.S. Pat. No. 5,654,540) (Stanton). The rejection is respectfully traversed.

Claim 17 depends from claim 1 and is patentable over Nishi for the same reasons provided above related to claim 1. Namely, claim 1 is patentable over Nishi at least because it recites a lithographic projection apparatus wherein the or each said grid grating is positioned so as to be substantially coplanar with a functional surface of said patterning structure supported by said support structure or a substrate held by said substrate table. As mentioned previously in the discussion related to claim 1, Nishi does not set forth a motivation to provide such a grid grating arrangement, nor does the knowledge generally available to one skilled in the art. It is respectfully submitted that Stanton fails to overcome this deficiency. Stanton only discloses in FIG. 5 an arrangement for monitoring the position of an x-y stage. However, as can be seen in FIG. 5, the x-grating and the y-grating are positioned perpendicularly to the plane of the workpiece. Therefore, it is respectfully submitted that Stanton teaches away from the invention recited by claim 17.

Claim 29 depends from claim 5 and is patentable over Nishi for the same reasons provided above related to claim 5. Namely, claim 5 is patentable over Nishi at least because it recites a lithographic projection apparatus comprising, *inter alia*, a displacement measuring system that measures the position of a moveable object, comprising one of said support structure and said substrate table, in at least two degrees of freedom, said displacement measuring system comprising at least one grid grating mounted on a reference frame and at least one sensor head mounted on said moveable object that measures displacement of said moveable object relative to said grid grating in at least two degrees of freedom. It is respectfully submitted that Stanton fails to overcome this deficiency as Stanton makes no mention of the above underlined features.

Claim 34 depends from claim 22 and is patentable over Nishi for the same reasons provided above related to claim 22. Namely, claim 34 is patentable over Nishi at least

because it recites a device manufacturing method wherein said at least one grid grating is positioned so as to be substantially coplanar with a functional surface of said patterning structure or the substrate. As mentioned previously in the discussion related to claim 22, Nishi does not set forth a motivation to provide such a grid grating arrangement, nor does the knowledge generally available to one skilled in the art. It is respectfully submitted that Stanton fails to overcome this deficiency. Stanton only discloses in FIG. 5 an arrangement for monitoring the position of an x-y stage. However, as can be seen in FIG. 5, the x-grating and the y-grating are positioned perpendicularly to the plane of the workpiece. Therefore, it is respectfully submitted that Stanton teaches away from the invention recited by claim 22.

Accordingly, reconsideration and withdrawal of the rejection of claims 17, 29 and 34 under 35 U.S.C. §103(a) based on Nishi in view of Stanton are respectfully requested.

Claim 27 was rejected under 35 U.S.C. §103(a) based on Taniguchi in view of Nishi.


Claim 27 has been cancelled without prejudice or disclaimer, thus rendering moot the rejection of claim 27.

In view of the foregoing, the claims are now believed to be in form for allowance, and such action is hereby solicited. If any point remains in issue which the Examiner feels may be best resolved through a personal or telephone interview, please contact the undersigned at the telephone number listed below.

All objections and rejections having been addressed, it is respectfully submitted that the present application is in a condition for allowance and a Notice to that effect is earnestly solicited.

Respectfully submitted,

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